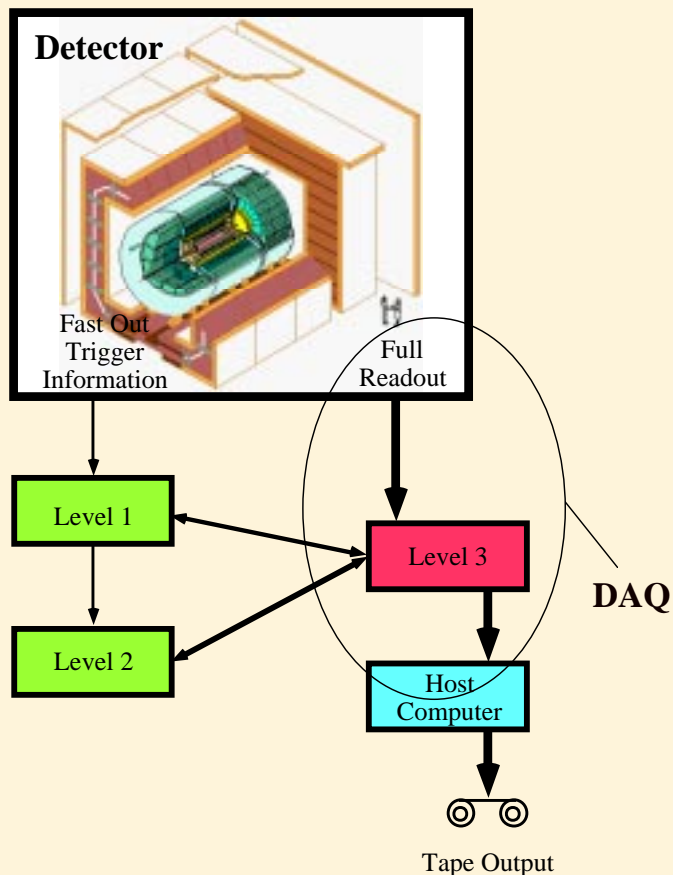


Trigger Software Status



- **L1 & L2**
- **L3**

Gordon Watts
Brown University
Online Meeting
August 13, 1998

<http://www-d0.fnal.gov/~gwatts/talks>

Trigger Software Overview

- Level 1

- Hardware and specialized processors
- Software exists in firmware
 - FPGAs, for example.

- Level 2

- Hardware are crates run by high end Compaq α processors
 - Global and preprocessors share same crate and alpha design.
- Code will run on board
 - C++ (gcc) without an OS

- Level 3/DAQ

- DAQ is specialized hardware
- Trigger nodes are generic NT systems (SMP)
- C++ with a full blown OS

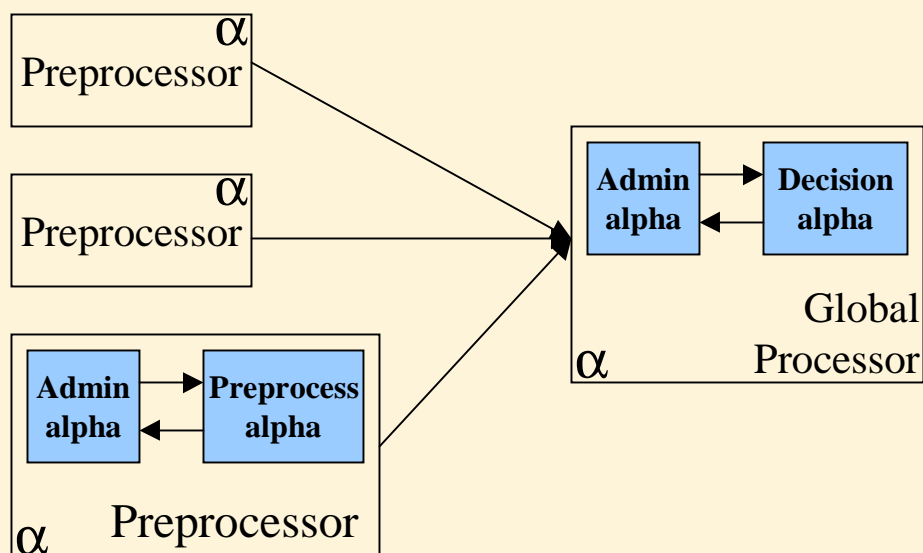


Level 1

- Software is written in **special hardware language**.
 - Each detector is writing its own triggering algorithms.
- **Direct simulation will be difficult**
 - Proprietary simulators used for the hardware; not easily mapped to out software.
 - Dave Toback is starting to look at simulation (for all of Level 1).
 - Will first have to tie together all the different L1 trigger efforts.
 - Integrated into the L3 Filter/Simulation Group (?).

Level 2

- Software is written in C++
- Hardware is the same for the global node and all preprocessors
 - Muon has some extra DSPs that will require programming.

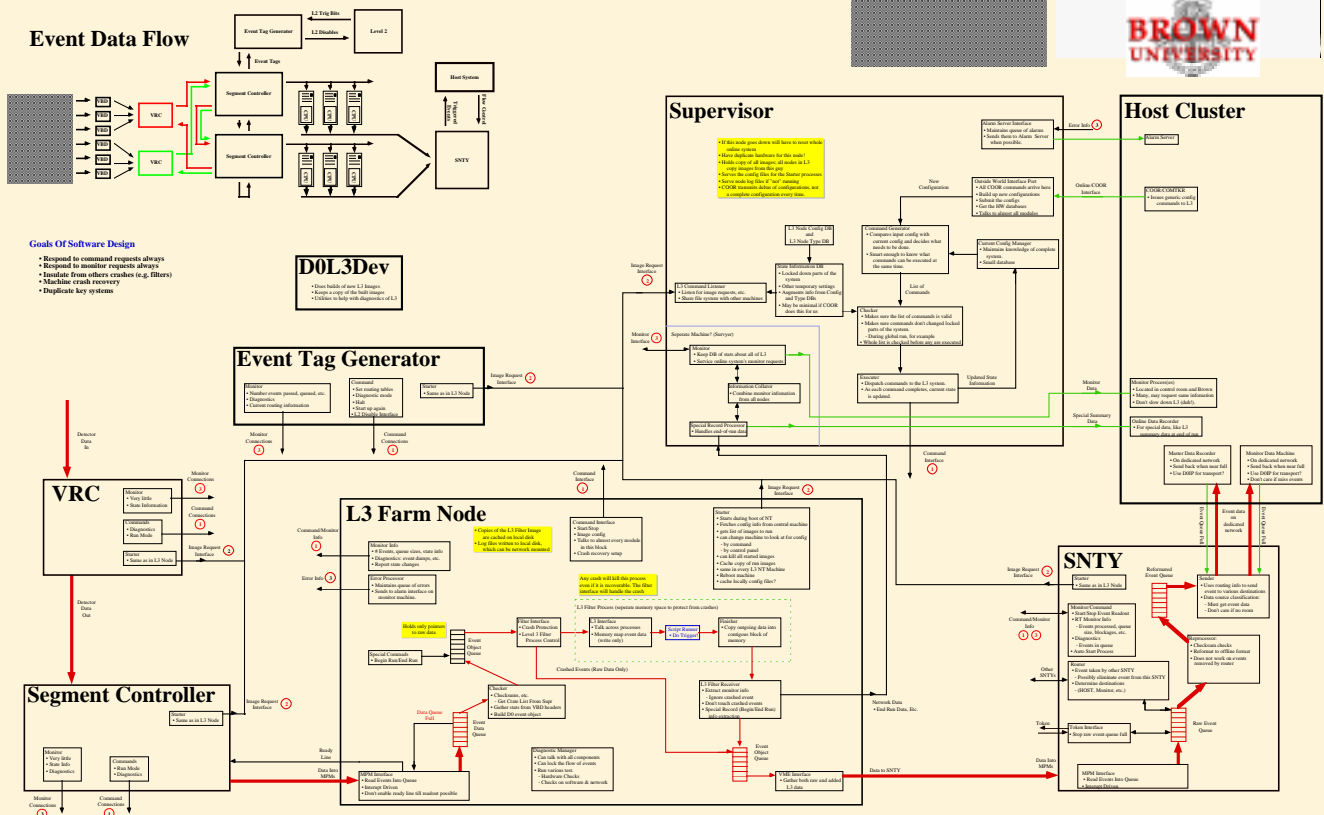


Level 2

- The algorithm framework for the global has been **prototyped**
 - C and C++ versions; C++ ran faster
- The Level 2 group expects to write a first version of the algorithms
 - Does not have the resources to do the required physics studies at this time.
- Low level trigger specification language defined.
 - A number of trigger specification languages are emerging.
 - Level 2, Level 3, and COOR are planning on discussing

Level 3

Level 3 Software Design



L3 High Speed Test

- This test is:
 - Read out a crate packed with Si readout electronics
 - Do high speed test to see how fast the hardware can run without errors
 - Check only a CRC in the data
 - Full data integrity check over millions of repetitions.
 - Examine a large fraction of each event.
 - Simple run control
 - Standalone (no COOR, etc.).
 - Something even hardware engineers can run
 - Monitor information

L3 High Speed Test

- When? Now!
 - Recent influx of killer (Mike & Ben) undergrads has really helped the effort!
 - Monitor
 - Based on shared memory; hope to distribute to D0-at-large eventually.
 - Access to monitor info from Excel.
 - Run Control
 - Based on very simple windows GUI app (MSVC makes it easy to build one of these)
 - No changes in configuration at this time.
 - Data Monitor
 - Dump a whole event (hex), print out, etc.

L3 High Speed Test

- The data analysis will require something that looks like a L3 Filter image.
 - This will not use d0om, as the final one will
 - Will run in a separate processor
 - 50% of the way to getting the L3 Filter Image going under in framework.
- The next goal of the project.

L3 Filters

- Large task ahead for the L3 Filters group:
 - Infrastructure
 - Script Runner Trigger Framework
 - Trigger List Creation and Maintenance
 - Verification Utilities, MC
 - Physics Tools
 - Long list
- Working on getting offline environment working on NT
 - To build trigger images.
- New members, fake tool by September offline milestone.

L3 & Online Integration

- COOR
 - Config information, control
 - Client/Server required
 - Soon!
 - L3 Configuration implementation.
- Error Logger
 - First version released in offline libraries
 - Paul P. & student are going to start looking at it from a L3 point of view
- Monitor Information
 - Public API for getting at counters, strings, and other simple objects that represent the state of L3 (and rest of online).

Conclusions

- L2 is going well
 - Talking with COOR already (test case)
- L3
 - Filter group is in communication with COOR for trigger specs. Still need more help.
 - Si Speed test will workout the first version of the L3 Framework software and initial versions of the monitor utilities
 - Lots of online group integration potential soon.